CLAIMS

1. A light-emitting device comprising:

a submount comprising a mount base, at least one light-emitting diode chip mounted thereon and electrically conducting lines formed on the mount base to be connected electrically to the light-emitting diode chip; and

a first plate for heat transfer comprising a metallic plate;

wherein a first plane of the mount base opposed to the metallic plate of the first plate is bonded thermally to said first plate.

2. The light-emitting device according to claim 1, wherein said first plate for heat transfer comprises the metallic plate, an insulator layer formed thereon, and an electrical connection pattern layer formed on the insulator layer, the first plate of the mount base of said submount is bonded thermally to a portion of the metallic plate of said first plate exposed at a side opposed to said submount by removing the insulator layer and the pattern layer, and the electrically conducting lines of said submount are connected electrically to the electrical connection pattern layer of said first plate.

3. The light-emitting device according to claim 2, wherein at least one of said mount base and said first plate for heat transfer has a protrusion having a plane to bond thermally

to the other of said mount base and said first plate.

4. The light-emitting device according to claim 2, wherein one of said mount base and said first plate for heat transfer has a protrusion while the other has a recess, so that the protrusion fits into the recess to bond thermally between them.

5. The light-emitting device according to claim 2, wherein the light-emitting diode chip is mounted face down to said mount base with a bonding material.

6. The light-emitting device according to claim 2, wherein the mount base comprises throughholes covered by a layer made of a material having a higher thermal conductivity than the mount base.

7. The light-emitting device according to claim 6, wherein said throughholes are filled with a material having a higher thermal conductivity than the mount base.

8. The light-emitting device according to claim 2, further comprising a metallic member provided between said mount base and said first plate for heat transfer, said metallic member making bond thermally with the mount base of said submount and with the exposed portion of the metallic plate of said first plate.

9. The light-emitting device according to claim 8, wherein said metallic member is a bonding member to bond the mount base of said submount to the exposed portion of the

metallic plate of said first plate.

10. The light-emitting device according to claim 1, wherein said mount base is made of a ceramic material.

11. The light-emitting device according to claim 1, wherein at least one groove is provided on the first plane of said mount base.

12. The light-emitting device according to claim 11, wherein each of said at least one groove comprises a bottom and two sides, a width between the two sides increasing in a direction from the bottom toward an opening of said each of said at least one groove.

13. The light-emitting device according to claim 11, further comprising a layer formed on said at least one groove made of a material having a thermal conductivity higher than said mount base.

14. The light-emitting device according to claim 11, wherein the light-emitting diode chip is mounted face down to the mount base with a bonding material, and said at least one groove is formed between the bonding material and the first plane of the mount base to bond thermally to the exposed portion of the metallic plate.

15. The light-emitting device according to claim 11, wherein a number of said at least one groove is equal to or larger than two, and density of the grooves increases toward a region just below the light-emitting diode chip.

16. The light-emitting device according to claim 11, wherein a number of said at least one groove is equal to or larger than two, the grooves have different depths, and depth of the grooves increases toward a region just below the light-emitting diode chip.

17. The light-emitting device according to claim 14, wherein a number of said at least one groove is equal to or larger than two, and density of the grooves increases toward a region just below the bonding material.

18. The light-emitting device according to claim 14, wherein a number of said at least one groove is equal to or larger than two, the grooves have different depths, and depth of the grooves increases toward a region just below the bonding material.

19. The light-emitting device according to claim 11, wherein a number of said at least one light-emitting diode chip is equal to or larger than two, a number of said at least one groove is equal to or larger than two, and density of the grooves increases toward a region just below a central light-emitting diode chip in the light-emitting diode chips.

20. The light-emitting device according to claim 11, wherein a number of said at least one light-emitting diode chip is equal to or larger than two, a number of said at least one groove is equal to or larger than two, the grooves

have different depths, and said grooves have deeper depth in a region between a central light-emitting chip among the at least one light-emitting diode chip and the exposed portion of the metallic plate than in the other regions.

21. The light-emitting device according to claim 1, further comprising a second plate for heat transfer bonded thermally to a second plane of said submount different from the first plane thereof.

22. The light-emitting device according to claim 21, wherein said second plate for heat transfer comprises another metallic plate, an insulator layer formed thereon, and an electrical connection pattern layer formed on the insulator layer, and the electrical connection pattern layer is connected electrically to the electrically conducting lines of said submount.

23. The light-emitting device according to claim 21, wherein one of said first and second plates comprises at least one plate member to bond thermally with the other of said first and second plates.

24. The light-emitting device according to claim 21, further comprising a thermally conducting member provided between said first and second plates to bond thermally with each of said first and second plates.

25. The light-emitting device according to claim 21, wherein one of said first and second planes has an opening

above said at least one light-emitting diode chip mounted on the mount base.

26. The light-emitting device according to claim 2 or 21, wherein said mount base includes a heat transfer material embedded therein, the heat transfer material having thermal conductivity higher than a main body of the mount base.

27. The light-emitting device according to claim 26, wherein the heat transfer material is bonded with at least one of said first and second plates.